

Claims

1. A method for controlling a pick-up for reading data streams from a storage medium, the data streams being distributed to more than one file on said storage medium and being separately intermediately buffered after reading, and after intermediate buffering the data streams being continuously read and used for simultaneous reproduction, with the buffers having different constant or variable output data rates, the method comprising:
- requesting the pick-up to read more data from a data stream when the remaining amount of buffered data relating to said data stream is below a threshold, wherein the request is scheduled to be served by the pick-up;
  - reading upon said requests portions of data from two or more data streams (S1,S2,S3) and buffering the read data in individual buffers while simultaneously outputting the buffered data at the respective buffer output rates, wherein said thresholds are reached after individual buffer bridge times, with the buffer bridge time of the buffer that relates to a first data stream (S1) with a higher data rate than the other of said data streams (S2,S3) being a first time, and the buffer bridge times of the buffers that relate to the other data streams (S2,S3) being integer ( $\lambda$ ) multiples of said first time, the integer ( $\lambda$ ) being at least two.

2. Method according to claim 1, wherein at least three data streams (S1,S2,S3) are read.
3. Method according to claim 2, wherein the integer ( $\lambda$ )  
5 is the same for all said other data streams (S2,S3).
4. Method according to claim 2 or 3, wherein said storage medium is an optical storage medium and the data streams comprise at least a video stream, an audio  
10 stream and a subtitle stream.
5. Method according to any of the previous claims, wherein initialization is done such that said first data stream (S1) is read after the other data streams  
15 (S2,S3) from the storage medium.
6. Method according to any of the previous claims, wherein initialization is done such that the buffer for the first data stream (S1) is filled completely,  
20 while the buffers for the other data streams (S2,S3) are filled only partially.
7. Method according to any of the previous claims, wherein initialization is done such that the order of  
25 reading the data streams (S2,S3) other than said first data stream (S1) from the storage medium is identical, or reverse, to the order that said other data streams (S2,S3) have on the storage medium.
- 30 8. Method according to any of the previous claims, wherein also data streams are read from said storage medium that are not subsequently buffered.

9. Apparatus for reading data streams (S1,S2,S3) from a storage medium, the data streams being distributed to more than one file on said storage medium and being separately intermediately buffered after reading, and  
5 after intermediate buffering the data streams being used for simultaneous reproduction, with the buffers having different constant or variable output data rates, the apparatus comprising:

- 10 - a pick-up for reading the data streams from said storage medium;
- means for requesting the pick-up to read more data from a data stream when the remaining amount of buffered data relating to said data stream is below a threshold, wherein the time between successive  
15 requests for reading the same data stream depends on the respective buffers size and its output data rate;
- means for scheduling said request before being served by the pick-up;
- 20 - first buffer with a first buffer size ( $B_1$ ) for buffering a portion of a first data stream (S1) of a first data type, with the average output data rate of said buffer being higher than the average output data rates of the buffers for the others of  
25 said data streams (S2,S3), wherein the time that is required for outputting the buffered portion of data at the respective buffer output rate is a first time; and
- one or more second buffers with individual second  
30 buffer sizes for buffering portions of one or more second data streams (S2,S3) of one or more second data types, wherein the individual times that are required for outputting the buffered portions of

data at the respective buffers average output rates are integer ( $\lambda$ ) multiples of said first time, the integer ( $\lambda$ ) being at least two.

- 5      10. Apparatus according to the previous claim, wherein said storage medium is an optical disc and wherein said first data stream (S1) is a video data stream and said second data types comprise audio data and subtitle data.